Space Weather Forecast

Issued on Sunday, 22 May 2022 at 13:04 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

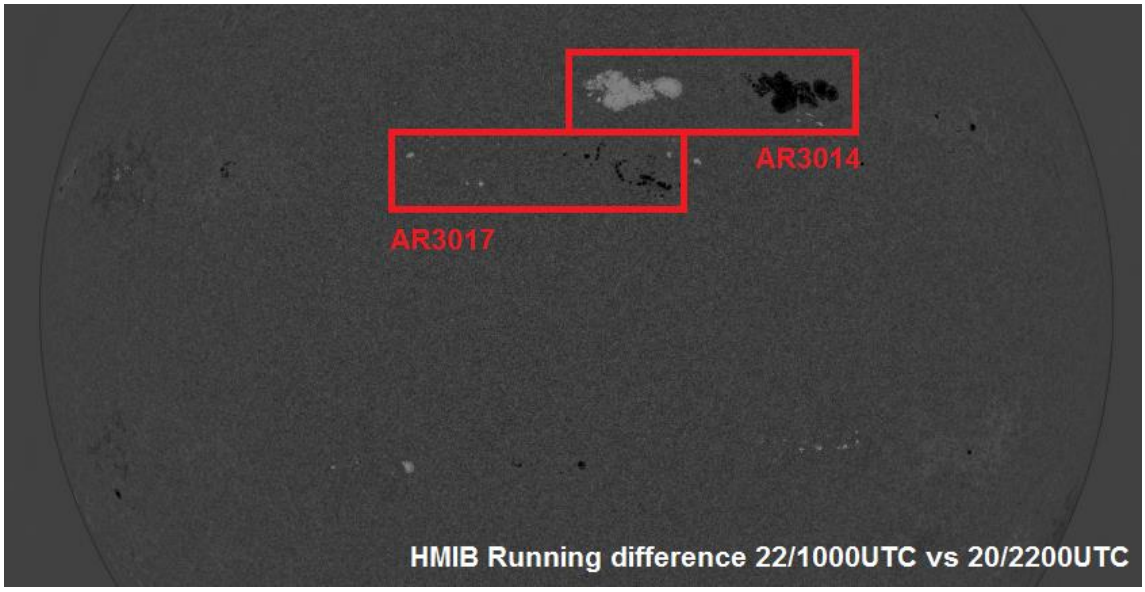
Space Weather Forecast Headline: Chance of moderate-class X-ray flares and R1-R2 Radio Blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has remained low over the past 24 hours, with only small common-class X-ray flares, near current background levels.

There are now up to nine sunspot regions on the Earth-facing side of the sun. These include the large and nominally complex region responsible for moderate-class flares last week (UTC), however this region was quiet in the past 24 hours and showed little overall growth or changes. While on paper less potent, the rapid growth trend of a spot group to the east made it one to watch, although this, too, proved relatively unremarkable in the period. The eastern solar horizon saw the arrival of up to two groups, with these likely to reveal more detail as the viewing angle improves.

Figure 1: Helioviewer.org processed running difference satellite imagery, showing growth in the two most active sunspot groups 'AR3017' and 'AR3014'. All sunspots are moving rightwards (west) in this image, with around 20 degrees covered in the 36 hours shown. For comparison between the start and end times, compare the white sunspots with the black within each red-boxed area. AR3017 can be seen to have grown in the period, while its larger neighbour, AR3014, has been somewhat more stable.



Satellite imagery in the past 24 hours revealed some notable events, not least a downward-directed Coronal Mass Ejection (CME), however this was determined to be far-sided to no effect

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at Earth. No Earth-directed CMEs were observed in available imagery in the last 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind was reflective of a very slowly waning fast wind from a 'coronal hole'. The solar wind speed accordingly gradually fall from early elevated highs to finish at slightly elevated levels. Both the number of particles in the solar wind and their associated magnetic field were both small-scale and stable near background levels. The net result of the above solar wind measures was often quiet, but with an isolated peak just below Minor Storm G1 in the 00-03UTC interval (reaching Kp4, where Minor Storm is G1 or Kp5)
Energetic Particles / Solar Radiation: No solar radiation storms were seen.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a daily chance of reaching moderate, with flares and R1-R2 radio blackouts most likely from the ever-present large and complex sunspot group near the middle of the sun, but also perhaps from one narrowly to its east given its recent growth.

A large CME has been observed leaving the far side of the sun earlier, indicating the presence of one or more active regions. These will need to be closely monitored over the next few days, as they gradually emerge over the eastern solar horizon.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs are currently expected.

Solar winds are now under the waning influence of a coronal hole and are expected to return to ambient levels over the following days. They might become slightly enhanced as a result of a possible tenuous second coronal hole on day three (Tuesday 24 May) but any impact on the geomagnetic conditions should remain minor and brief.

Geomagnetic activity is therefore expected to be mostly quiet through the coming four days.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, but with a daily Slight Chance of flux reaching S1, should any notable flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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